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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/018,604	06/25/2002	Tove Martel Ida Else Christensen	DYOU27.001APC	8385

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EXAMINER	
SAIDHA, TEKCHAND	
ART UNIT	**PAPER NUMBER**
1652	

DATE MAILED: 08/31/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/018,604	CHRISTENSEN ET AL.	
	Examiner	Art Unit	
	Tekchand Saidha	1652	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 June 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-30 and 34-36* is/are pending in the application.

4a) Of the above claim(s) *24-30 and 34-36* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. *Election*

Applicant's election with traverse of Group I, claims 1-23, filed 28 June 2004 is acknowledged. The traversal is on the grounds that examination of all the claims will not be undue burden upon the Examiner. This is not found persuasive because the PME modified pectin, the special technical feature, is not a contribution over the prior art, as explained in the 'Lack of Unity' requirement made in the prior Office Action.

The lack of unity determination is still deemed proper and is therefore made FINAL.

New claims 34-36 are drawn to a separate invention and is being separated into group IV, as being drawn to a method comprising contacting a pectin with a PME, wherein said PME reduces the number of ester group. This group lack unity, because the special technical feature of PME modified pectin is not a contribution over the prior art of USP 6,268,195 or 6,083,540.

New restricted grouping in view of the newly added claims is as follows:

Group I, claim(s) 1-23, drawn to a process of modifying pectin by silencing polygalacturonase (PG) activity in a host cell having Pectin methylesterase (PME) [E.C. 3.1.1.11] and PG activities.

Group II, claim(s) 24-27, drawn to a PME modified pectin according to claim 1.

Group III, claim(s) 28-30, drawn to a transformed host cell according to claim 1.

Group IV, claims 34-36, drawn to a method comprising contacting a pectin with a PME, wherein said PME reduces the number of ester group.

2. Claims 1-30 & 34-36 (new) are present in this application.

3. **Claims withdrawn** :

Claims 24-30 & 34-36 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention, the requirement having been traversed.

4. Claims 1-23 are pending and under consideration in this examination.

5. ***Priority***

Acknowledgment is made of applicants' claim for priority based on an application filed in United Kingdom on 17 June 1999.

6. ***Specification***

The specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

7. ***35 U.S.C. 112, first paragraph (Written Description)***

Claims 1-23 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to

reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention.

Claim 1-23 are directed to a process of modifying pectin by (i) providing a host having native pectin methyl esterase (PME) and polygalacturonase (PG) activity; (ii) transforming said host by silencing PG activity, thereby providing increased PME to PG ratio; (iii) preparing a PME extract from the transformed host; (iv) treating the pectin with PME extract to modify the pectin, the claimed genus.

The specification, however, only provides a single representative species of a process of modifying pectin by (i) providing a tomato plant host having native pectin methyl esterase (PME) and polygalacturonase (PG) activity; (ii) transforming said host by silencing PG activity, wherein the PG activity is silenced by expression of a nucleic acid sequence of SEQ ID Nos. 1 or 4 in an antisense orientation, thereby providing increased PME to PG ratio; (iii) isolating or preparing a PME extract from the transformed plant; (iv) treating the pectin with PME extract, and (v) isolating the de-esterified pectin.

The specification also fails to describe additional representative species of these processes whereby any host can be transformed with in PG encoding nucleic acid in an anti-sense orientation by any identifying structural characteristics other than the properties or activity recited in claims, for which no predictability of structure is apparent. Given this lack of additional representative species, Applicants have failed

to sufficiently describe the claimed invention, in such full, clear, concise, and exact terms that a skilled artisan would recognize Applicants were in possession of the claimed invention.

8. ***Enablement***

Claims 1-23 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for a process of modifying pectin by (i) providing a tomato plant host having native pectin methyl esterase (PME) and polygalacturonase (PG) activity; (ii) transforming said host by silencing PG activity, wherein the PG activity is silenced by expression of a nucleic acid sequence of SEQ ID Nos. 1 or 4 in an antisense orientation, thereby providing increased PME to PG ratio; (iii) isolating or preparing a PME extract from the transformed plant; (iv) treating the pectin with PME extract, and (v) isolating the de-esterified pectin, does not reasonably provide enablement for all any host wherein the native PME & PG activities are silenced by expression of any PG encoding nucleic acid in the antisense orientation. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the invention commensurate in scope with these claims. Factors to be considered in determining whether undue experimentation is required have been described above. The factors most relevant to this rejection are the scope of the claims, unpredictability in the art, the amount of direction or guidance presented, and the amount of experimentation necessary.

The claim is drawn to encompass any host, which may be a cell, tissue, organ or plant and transformed with silencing nucleic acid sequences from any source. While the specification discloses possible tomato plant as the host and SEQ ID Nos. 1 and 4 as the PG silencing nucleotides. Despite knowledge in the art for the production of numerous PG encoding nucleic acids which can be constructed in the antisense orientation in order to limit or abolish PG expression in the host, the specification fails to provide additional guidance regarding construct of such antisense molecules from any source and which can be effective in limiting or abolishing PG expression. Further, as is well known in the 'antisense technology', "antisense" refers to an expressed nucleotide sequence which is complementary to, and can therefore be effective in forming a duplex with the native nucleic acid or gene or a naturally expressed nucleotide sequence associated with the native PG enzyme [see for example, page 14 of the instant specification]. Therefore antisense sequence corresponding to a natural plant gene has been found to be more effective and widely used to control plant biochemistry or development [see Grierson et al (1986, Nucleic Acid Reviews, 14 p 8595-2603, IDS)]. Based upon what is known in the prior art it would be highly unpredictable for one skilled in the art to silence the PG activity by expressing any PG encoding nucleotide or to part of a nucleotide sequence of SEQ ID NO: 1 or 4.

While recombinant techniques are known, it is not routine in the art to screen large numbers of PG encoding nucleotides, or prepare host cells transformed with part(s) of a nucleotide sequence in an antisense orientation; or prepare transformed host cells comprising variants, homologues or fragments of SEQ ID NO : 1, 2 or 4, which may be effective in silencing PG activity; and which may be used in preparing a PME extract and which can be further modify pectin. Therefore, one skilled in the art would require guidance, such as, the 3-dimensional structures of various PG as well as occurrence of homologues in order to make and use the PME having silenced PG enzyme in the claimed process in a manner reasonably commensurate with the scope of the claim. Without such guidance, the experimentation left to those skilled in the art is undue.

9. ***Claim Rejections - 35 USC §112*** (second paragraph)

Claims 1-23 are rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1-14, recite abbreviations 'PME' or 'PG' or both. The claims are indefinite because it is not clear what the abbreviation stands for ? The first use of a 'not so common' abbreviation must be spelled out which may be abbreviated in the subsequent claims.

Claims 15-23 are included in this rejection for failing to correct the defect present in the base claim.

10. Claims 1-23 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01. The omitted steps are: step 5, as follows.

(i) providing a tomato plant host having native pectin methyl esterase (PME) and polygalacturonase (PG) activity;

(ii) transforming said host by silencing PG activity, wherein the PG activity is silenced by expression of a nucleic acid sequence of SEQ ID Nos. 1 or 4 in an antisense orientation, thereby providing increased PME to PG ratio;

(iii) isolating or preparing a PME extract from the transformed plant;

(iv) treating the pectin with PME extract, and

(v) isolating the de-esterified pectin

11. Claim 2 recites the limitation "native PG" in claim 1. There is insufficient antecedent basis for this limitation in the claim. Claim 2 is rejected for lack of antecedent basis.

12. ***Claim Rejections - 35 USC §103***

The following is a quotation of 35 U.S.C.§ 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over EP 0 532 060 A1 A2 [Bridges et al., 1993, IDS] and WO 97/03574 [Christensen et al. Feb 6, 1997, IDS].

Bridges et al. teach recombinant DNA encoding tomato (host inherently having native PME & PG) Polygalacturonase of SEQ ID NO: 1 [Accession No. A15981, 100% identical(DNA)] and SEQ ID NO: 2 [Accession No. AAR 32107, 100% identical (protein)] – see the enclosed sequence search alignments.

Anti-sense molecule (or complimentary sequence to SEQ ID NO: 1) or inverted base sequence complementary to a substantial sequence of bases in polygalacturonase mRNA is also taught. The anti-mRNA produced thereby delays softening of tomato fruit (claims 1-7). Examples of fruit softening enzymes are polygalacturonase and pectin methyl esterase. Pectin methyl esterase cDNA is also disclosed [see page 12].

Bridges et al. do no teach enzymatic de-esterification or 'modifying a pectin', using pectin methyl esterase extract.

Christensen et al. [WO 97/03574, 1997] teach enzymatic de-esterification [block-wise] or 'modifying a pectin', using recombinant pectin methyl esterase from orange. PME's are known to de-esterify high ester pectin to low ester pectin in random or blockwise manner (see specification, page 2), leaving unesterified galucturonic units (claims 1-9). The limitations of claims 10-23, to a process wherein PME modified pectin contains 55% to about 88% ester groups, or 70% to about 80% ester groups, or 72% to about 80% ester groups, or 76% to about 80% ester groups, or wherein the medium is aqueous, acidic, and pH is 4.0, or wherein the aqueous medium is a beverage, or wherein the beverage is acidified milk beverage,...a fruit juice, etc., or wherein the medium comprises a protein, dairy product or vegetable protein, are taught through out the specification, especially claims (see specification, pages 85-90).

Christensen et al. do not teach the transformation of a host plant having the native enzyme activities of PG & PME, wherein the PG expression is blocked or silenced using anti-sense or complimentary molecule of SEQ ID NO: 1 or 4.

However, the combined teachings of the prior art cited above teach all the elements of the claimed invention.

Thus from the knowledge available in the teachings of the prior art as described above, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the recombinant system of Bridges et al. teaching transforming a host having native PME & PG, wherein the PG expression system is silenced using SEQ ID NO: 1 or fragments thereof in an anti-sense orientation. By blocking the expression of PG, the system inherently increases the ratio of PME/PG, and be one of the obvious choices to extract and purify PME, which can then be used in the enzymatic de-esterification of pectin as taught by Christensen et al. One having ordinary skill in the art would have a reasonable expectation of success in developing such a method of obtaining PME extract or SEQ ID NO : 2, in view of the well established protocol of Bridges et al.

One having ordinary skill in the art would have been motivated to use the anti-sense technology of Bridges et al. as a means to enhance PME/PG ratio [which is inherently enhanced in the teachings of Bridges et al.] or as an alternative means to reduce or abolish PG production which may contaminate the extract and/or the isolation (or purification) of PME so needed for the de-esterification of the pectin, and wherein de-esterified pectin having diversified use in the food, pharmaceutical and cosmetic industries.

Thus, the claimed invention was within the ordinary skill in the art to make and use at the time was made and was as a whole, *prima facie* obvious.

Note: Applicants' disclosed nucleic acid sequences are well known in the art. From a nucleotide sequence known in the art, it would have been obvious to one of ordinary skill in the art to produce a compliment of that sequence using the base pairing rules; thus the sequence A-T-G-C in a DNA strand is complimentary to the sequence T-A-C-G in a second DNA strand and to the sequence U-A-C-G in an RNA strand.

13. No claim is allowed.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tekchand Saidha whose telephone number is (571) 272 0940. The examiner can normally be reached on 8.30 am - 5.00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ponnathapu Achutamurthy can be reached on (571) 272 0928. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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